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Economic Status and Old-Age Health in Poverty-Stricken Myanmar

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Abstract

Objective: We examine the association between poverty, economic inequality, and health among elderly in Myanmar. **Method:** We analyze 2012 data from Myanmar's first representative survey of older adults to investigate how health indicators vary across wealth quintiles as measured by household possessions and housing quality. **Results:** Poverty and poor health are pervasive. Self-assessed health, sensory impairment, and functional limitation consistently improve with higher wealth levels regardless of socio-demographic controls. Differentials in self-rated health and sensory impairment between the bottom and second quintiles are clearly evident, suggesting that relative economic inequality matters even among very poor elders and that a small difference in wealth can matter in an extreme poverty setting. **Discussion:** Findings support a global theory of economic gradients in health regardless of level of societal poverty. Modest efforts to improve the standard of living among elderly may improve not only their material well-being but also their health.

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Introduction

Population aging is a worldwide phenomenon with profound implications for the global burden of disease and public health (Abegunde, Mathers, Adam, Ortegon, & Strong, 2007; Butler, 1997; Lloyd-Sherlock, 2000; Murray & Lopez, 1997). It affects not only affluent or rapidly growing middle-income nations but also very poor countries (Barrientos, Gorman, & Heslop, 2003). Indeed, many of today's older persons live in poverty-stricken environments (Aboderin, 2010; United Nations, 2013). Extensive literature establishes that economic status has important influences on health of older-aged populations and is sometimes assumed to be universal (Chinese Academy of Social Sciences, Indian National Science Academy, Indonesian Academy of Sciences, National Research Council, & Science Council of Japan, 2011; E. Grundy & Sloggett, 2002; House et al., 1994; National Research Council, 2001). Evidence from developed contexts consistently shows that poor elders tend to have shorter and sicker lives than those with more material wealth (Adler & Ostrove, 1999; Huisman, Read, Towriss, Deeg, & Grundy, 2013). Emerging research from middle-income and other resource-limited countries including ones in Asia offers mixed findings regarding the wealth–health link (Beydoun & Popkin, 2005; Lima-Costa, De Oliveira, Macinko, & Marmot, 2012; Ng et al. 2010; Zimmer & Amornsirisomboon, 2001; Zimmer & Prachuabmoh, 2012). This underscores the crucial need for context-specific studies of the relationship as urged in the collaborative assessment of population aging in Asia issued jointly by the national academies of sciences in China, India, Indonesia, Japan, and the United States (Chinese Academy of Social Sciences et al., 2011). Moreover, there is a particular need to examine how economic deprivation and inequality are related with health among older adults in extreme poverty situations given the paucity of such studies not only in Asia but throughout the developing world with only few exceptions (Szwarcwald, Mota, Damacena, & Pareira, 2011; Zimmer, 2008).

As Zimmer (2008) has pointed out, there is a reasonable basis to suspect that health differentials with regard to economic status might be particularly weak or absent in severe poverty settings, especially among those at the bottom of the socio-economic spectrum. In such economically depressed settings, health care resources are almost certain to be underdeveloped and underfunded. Although economic resources may allow the purchase of health care in more prosperous settings, the lack of available health services, especially in

areas where poverty is most severe, could limit access regardless of any wealth on the part of the individual seeking help and thus could rule out an association between health and economic status. In addition, even if limited health services are available either locally or at some distance, the inadequacy of financial resources even among those who were slightly better off might still be insufficient to cover the transportation cost, possible charges for service, or cost of medicines. Moreover, throughout the life course, mortality selection will disproportionately eliminate the less healthy persons, and by older ages, economic gradients that are evident among persons at younger adult ages would be moderated or eliminated (Huisman et al., 2013).

Our study describes health status and poverty situation and examines the associations between poverty, wealth disparity, and health among elderly in Myanmar, which is not only the poorest country in Southeast Asia but also one of the poorest countries in the world. The analysis is based on data from the country's first representative survey of older persons. Our research goals are twofold. First, we ascertain the extent to which health disparities exist across different wealth groups, with special attention to the differentials between older persons who are very poor and those who are poor. The second objective is to examine how economic status–health gradients vary across health indicators. Understanding elderly health status will shed light on Myanmar's burden of disease associated with population aging, which is likely to contribute to the burden of long-term care on the health system and families. The nature of the wealth–health link also provides useful information for policies aimed at reducing health disparities among elderly in extremely poor environments.

Given that many elderly in Myanmar have endured years of political strife and poor living conditions, the country setting provides an exceptional opportunity to differentiate between two competing hypotheses. On one hand, it can be hypothesized that distinct economic gradients in health exist among older persons in Myanmar as much research has documented in more developed settings. On the other hand, differences may be minimal given the country's widespread severe poverty, fragile health system, inadequate health care, and weak infrastructure. For example, economic status differences among a wide swathe of the population may be too minor to have an impact on health differentials. Also, even for the minority that is substantially better off, effective health care may be largely non-existent or inaccessible. Therefore, how lifetime economic hardship, poverty, and wealth inequality may affect the aging process and old-age health in Myanmar remains an open question. Finding answers to this question can contribute to the construction of a global theory of economic gradients in health by indicating whether the relationship is maintained or differs significantly in poverty-stricken settings, an issue that, as noted above, has received very limited attention so far.

Table 1. Recent Economic and Health Indicators of Myanmar Compared With Thailand and Southeast Asia Region.

Indicators	Myanmar	Thailand[a]	Southeast Asia region[b]
GDP per capita (PPP), 2010[c]	1,255	9,215	—
% of population living below the national poverty line[d]	25.6 (2010)	13.2 (2011)	—
% rural 2014[e]	66.4	50.8	53.0
% of main roads paved[f]	11.9 (2005)	98.5 (2000)	—
Life expectancy at birth (years), 2013[g]	65	75	71
Health expenditure per capita as a % of GDP, 2011[f]	2.0	4.1	4.0
Health expenditure per capita (constant 2005 international $), 2011[f]	27.9	353.3	531.3
Nurses and midwives per 100,000 persons, 2004[f]	98	152	—
Hospital beds per 100,000 persons	60 (2006)	210 (2010)	—
% health expenditure that is out of pocket, 2011[f]	80.7	13.7	43.0

Note. GDP = gross domestic product; PPP = purchasing power parity
[a]Thailand is selected to represent a middle-income country in the Southeast Asia region.
[b]Southeast Asia countries include Brunei, Cambodia, Indonesia, Laos, Myanmar, the Philippines, Singapore, Thailand, Timor-Leste, and Vietnam.
[c]International Monetary Fund, World Economic Outlook Database, April 2013.
[d]Asian Development Bank, Country Fact Sheets, April 2013.
[e]United Nations, World Urbanization Prospects: The 2014 Revision (accessed September 28, 2014).
[f]World Bank, World Development Indicators Data Bank (accessed March 6, 2014).
[g]Population Reference Bureau, World Population Data Sheet, 2013.

Country Context

Myanmar provides a compelling setting to help fill the research gaps. Myanmar is one of the poorest and least healthy countries in Asia and was considered one of the most secluded nations until a series of ongoing political and structural reforms were initiated in 2010 (The Lancet, 2012). Its population aged 60 and above is estimated to nearly triple from 8% in 2010 to 22% in 2050 (United Nations, 2013).

Decades of political turmoil and economic isolation left Myanmar underdeveloped and unhealthy, as evidenced in economic and health indicators (Table 1). Its per capita gross domestic product (GDP) of $1,255 in 2010 is only 14% as high as that for its middle-income neighbor, Thailand. Myanmar

also has twice as many people proportionally living below the national poverty line (26%) as Thailand (13%). The population is predominantly rural and with the percentage in rural areas considerably above both Thailand and the regional average. Its population of more than 50 million also bears grave health outcomes. Life expectancy at birth, for instance, is 65 years for Myanmar—6 years below the regional estimate and a decade below that for Thailand.

Myanmar's health system is severely underfunded (J. Grundy, Annear, Ahmed, & Biggs, 2014). The government spends 2% of its GDP on health—half of what Southeast Asian countries spend on average. This equates to a health expenditure of $28 per capita in Myanmar, a mere sliver to the regional average of $531. In addition, the per capita official development assistance (ODA) for health is lower in Myanmar than other low-income Southeast Asian countries including Cambodia and Laos (Saw et al., 2013). Shortages of health personnel and infrastructure are also evident. There are only 98 nurses/midwives and 60 hospital beds per 100,000 population in Myanmar, whereas the corresponding statistics for Thailand are 152 and 210, respectively. For specialized health care, there are only 61 oncologists in the entire country and only 3 radiation machines throughout capital city Yangon (Shobert, 2013).

The share of payments for health services that are out-of-pocket in Myanmar is among the world's highest, accounting for 81% of the total health care expenditure compared with 14% in Thailand and 43% in the region. Although physicians' service and equipment at public health facilities are theoretically free-of-charge, patients are expected to give gifts for medical professionals who treat them and to pay for all medicines and supplies used in treating them (Kenyon, 2013; Song, 2013). In addition to high level of private financing of health care, other barriers include reduced accessibility due to geographic and infrastructure factors. The lack of paved main roads in Myanmar and security issues in some regions further hinders access to health services (Perlez, 2014).

Extensive reforms since 2010 have led the Myanmar government to reengage with the international community and to increase public spending on health. Concerns nevertheless remain regarding underinvestment and ineffective coordination among relevant stakeholders (Risso-Gill, McKee, Coker, Piot, & Legido-Quigley, 2014). Myanmar has several technically sound health policies but few resources and limited capacity to implement them (Han, 2012). For example, the Healthy Aging Project initiated by the Ministry of Health since the early 1990s to promote preventive health care among elderly has covered only 25% of townships nationwide by 2011 (Moe, Tha, Naing, & Htike, 2012). The lack of statistical infrastructure and a weak health

information system has hampered development efforts currently underway in the country (Spoorenberg, 2013). Myanmar also continues to be plagued by inequalities in infrastructure, transportation access, and program coverage (Saw et al., 2013). Recent strong economic growth has been accompanied by rising living costs and widening income gaps. The current health financing system is feared not only to cause high levels of catastrophic health expenditure but also to exacerbate health disparities among different segments of the population (Lwin, Sillabutra, & Kongsin, 2011).

Data and Method

Data come from the Myanmar Aging Survey (MAS), the first national survey of its kind, conducted in 2012 under the sponsorship of HelpAge International. Its sample consists of 4,080 persons aged 60 and older throughout almost all of Myanmar. The multi-stage sampling involved selecting 60 townships and then 150 rural villages and 90 urban wards within them. In both stages, selection was proportional to size. Only Kachin State was excluded for security reasons. Its population is distinctive with most belonging to the Kachin ethnic minority and being Christian (Wikipedia, 2014). However, because it represents only 3% of the national total population, the impact on the national representativeness of the survey sample should be minor at most (Department of Population, 2014).

Among sampled households, only one respondent aged 60 or older was randomly selected for interview. In cases where the respondent was too incapacitated to be interviewed, a proxy was interviewed instead, typically the next-of-kin. The response rate is 92.6%. The survey design called for a modest oversampling of persons aged 70 and older compared with those aged 60 to 69 (Myanmar Survey Research, 2012). All results provided in the present study are weighted to account for the sample design including the fact that only one older adult was chosen for interview per sampled household. After weighting, results are nationally representative except for the omission of Kachin state.

Health Measures

We consider four dimensions of health conditions reported by respondents. The first measure is *self-rated health*, which is included as a continuous variable indicating whether the elder rated his or her current physical health as *very good* (coded 1), *good* (2), *fair* (3), *poor* (4), or *very poor* (5). In other words, a higher score indicates worse self-rated health. Mean score for self-rated health is 2.84 with a standard deviation of 0.87.

The second measure assesses *functional limitations* among the elderly. We incorporate a continuous variable summing the number of five common physical functions with which the respondents had at least some difficulty performing on their own. The specific functions were walking 200 to 300 m, lifting 5 kg, crouching/squatting, using fingers to grasp things, and walking up and down a flight of stairs. Approximately 37% of the sample reported having difficulty lifting 5 kg. Meanwhile, lower proportions experience difficulty walking up and down stairs (32%), walking 200 to 300 m (32%), and crouching/squatting (27%). Only 13% of older persons reported troubles using fingers to hold things. In sum, elders in the sample have an average of 1.40 functional limitations with a standard deviation of 1.72.

The third health measure, *sensory impairment*, is a dichotomous variable indicating whether the respondent has problems with eyesight and/or hearing. Those who reported being unable to see or hear well (even if wearing glasses or using a hearing aid if they had them) are considered sensory-impaired. Even with glasses or hearing aid, 28% reported difficulty seeing and 14% difficulty hearing. Note that 27% of Myanmar elders wear eyeglasses to correct their eyesight, whereas only 1% uses a hearing aid. About 35% of the sample has sensory impairments, with one fifth of these sensory-impaired elderly suffering from both sighting and hearing impairments.

The fourth and last health indicator, *disability status*, is measured as a dichotomous variable indicating whether the elderly reported experiencing a lot of difficulty performing or was unable to perform on his or her own at least one of the five activities of daily living (ADL). In order from the most to least frequently reported, with the percent reporting serious difficulty in parentheses, these are toileting (6%), getting up after lying down (6%), bathing (5%), dressing (4%), and eating (3%). In sum, proportion of the sample with disability (i.e., having serious difficulty with one or more ADL task) is 9.4%. We operationalize this health measure as a dichotomous rather than continuous variable, because 78% of the sample reported that they could do all five ADL tasks independently. Our robustness checks show that regardless of how this variable is operationalized, multivariate analysis yields similar results regarding the direction and magnitude of each covariate.

Wealth Measure

We measure older persons' economic status by a household wealth index based on ownership of household possessions and housing quality. Such information is commonly asked in surveys in developing countries (Rutstein

& Johnson, 2004). As Zimmer (2008) pointed out, even within resource-poor settings, the placement of a particular household within a hierarchy can be assessed by whether or not the household has various possessions and the favorable structural components of the dwelling unit. We consider whether the respondent's household possesses the following 17 items: radio, television, video/DVD player, personal music player, telephone, computer, store-bought furniture, electric fan, air conditioner, refrigerator, washing machine, gas cooker, electric/rice cooker, microwave oven, bicycle, motorcycle, and car/truck. In addition, we consider whether the house has the following four favorable structural components: piped water, sit/squat toilet, modern floors (made of brick, stone, cement, or tile), and modern walls (made of brick, wood, or cement). We construct the household wealth index by multiplying a normalized score for each household possession by its weight (Filmer & Pritchett, 2001). Weights are determined using factor scores derived from the first principal components analysis. Individuals are then ranked from top to bottom according to the wealth index and divided into quintiles. Several advantages of the principal components approach in absence of data that directly assess household wealth are discussed in Zimmer (2008). These include circumventing arbitrary numeric values being assigned to items, including a simple count that treats each as being equal despite differences in their importance. Moreover, there is evidence that the index is in reasonable agreement with other indicators of economic well-being including household consumption (Bollen, Glanville, & Stecklov, 2002; Filmer & Pritchett, 2001; Houweling, Kunst, & Mackenbach, 2003).

Socio-Demographic Variables

We incorporate socio-demographic variables shown in previous research to be related to economic and health status. This includes sex, age, current marital status, number of household members aged 18 and above, educational attainment, and urban–rural location of residence. Marital status is measured dichotomously indicating whether or not the respondent is married at the time of survey as opposed to being widowed and to a much lesser extent, being separated/divorced, or never married. Number of household members aged 18 and above is included because asset-based measure of household wealth is sensitive to household size. More people will have bought things counted as household possessions, and larger households tend to have greater need for various appliances. Finally, educational attainment is incorporated as a categorical variable indicating whether the respondent had no education, some primary, complete primary, or beyond primary education.

Analytic Approach

We start describing the sample in terms of socio-demographic characteristics and to assess how these characteristics vary across wealth quintiles. Second, we examine descriptively how the four health measures (i.e., self-rated health, functional limitation, sensory impairment, and disability) differ by age, sex, education, location of residence, and economic status (as expressed by household wealth quintiles). Finally, we use multivariate analysis to investigate the associations between economic status and health in older ages, net of socio-demographic characteristics. We utilize ordinary least square (OLS) regressions when the dependent variable is continuous (i.e., self-rated health and number of functional limitations) and binary logistic regressions when the dependent variable is binary (i.e., sensory impairment and disability).

Results

Sample Description

Table 2 shows socio-demographic characteristics of all elderly and separately for those in each of the five wealth quintiles. It also illustrates the extent of wealth disparity among respondents in each wealth quintile by describing ownership of household possessions and favorable housing features. Slightly more than half of the sample are females. Proportions of female in each quintile vary modestly, ranging from 51% among elders in the third quintile to 57% among those in the second quintile. Approximately half of the sample is aged between 60 and 69, one third aged 70 to 79 and 14% aged 80 or older. The mean age of the sample is 70.5 years. There are only small differences across the five wealth quintiles with regard to age distribution and average age. Older persons who are married at the time of survey account for 54% of the sample. The proportions married increase across wealth quintiles. Whereas about half of elders in the bottom two quintiles are married, proportions married for the third, fourth, and highest quintiles are 54%, 58%, and 60%, respectively. Although this possibly reflects greater longevity of respondents and their spouses among those economically better off, other influences are likely at play. For example, households with married couples average substantially more adult members than those of older-aged persons who are not currently married (4.11 vs. 3.37), a feature that is typically strongly associated with number of household possessions.

On average, elders live in households with approximately 3.8 members aged 18 and older. Results indicate that households in the top wealth quintiles are larger than those in lower quintiles with respect to the number of adult

Table 2. Characteristics of Older Persons in the Sample by Wealth Quintile.

Characteristics	Whole country	Wealth quintile[a]				
		Lowest	Second	Third	Fourth	Highest
Wealth quintile (unweighted number)	4,080	951	755	828	775	771
Wealth quintile (weighted %)	100.0	21.9	18.1	20.0	20.0	20.0
% female	54.0	54.2	57.4	51.1	56.1	51.7
Age distribution (%)						
60-69	51.8	50.9	52.9	50.8	54.5	49.9
70-79	33.9	34.3	35.1	34.5	30.6	35.1
80+	14.3	14.8	12.0	14.7	14.9	15.0
M age	70.46	70.72	70.06	70.62	70.15	70.68
% currently married	54.2	49.1	50.8	54.2	57.5	59.8
M number of household members aged 18+	3.77	3.11	3.56	3.76	4.10	4.35
Education (%)						
No education	22.1	31.3	26.3	23.0	18.1	11.1
Some primary	44.9	50.8	52.8	47.2	42.8	31.2
Complete primary	14.9	11.3	12.4	16.5	18.4	16.1
Beyond primary	18.1	6.6	8.5	13.3	20.8	41.6
Location of residence (%)						
Rural	68.6	85.7	83.6	78.3	61.3	33.8
Urban	31.4	14.3	16.4	21.7	38.7	66.2
% with none of the 17 household possessions[b]	20.1	64.1	25.8	6.3	0.5	0.0
M number of 17 households possessions	2.81	0.36	1.03	1.97	3.74	7.01
% lacking all four favorable housing features[c]	35.7	100.0	41.8	19.4	10.3	1.7
M number of four favorable housing features	1.18	0.00	0.58	1.17	1.55	2.65

Source. The 2012 Myanmar Aging Survey.

[a]The numbers in each quintile are not identical given that there is some clustering in the wealth scores and because the quintiles are based on weighted numbers.

[b]The 17 household possessions include radio, television, video/DVD player, personal music player, telephone, computer, store-bought furniture, electric fan, air conditioner, refrigerator, washing machine, gas cooker, electric/rice cooker, microwave oven, bicycle, motorcycle, and car/truck.

[c]The four favorable housing features include piped water, sit/squat toilet, modern floors (made of brick, stone, cement, or tile), and modern walls (made of brick, wood, or cement).

members. For instance, although the average number of adult members in the households in the lowest wealth quintile is just above 3, elders in the top wealth bracket reside in households with more than 4 adult members. In terms of educational attainment, approximately one third of Myanmar elders had complete primary education and beyond, whereas one fifth had no education and more than two fifths had some primary education. Results show that elders from the poorest households had much lower educational attainment than those from upper quintiles. More than 80% of the poorest elderly did not complete primary education, compared with 42% among their wealthiest counterparts. Just 7% of this group had beyond primary education, relative to 42% among elders from the highest quintile. Nearly 70% of the sample have rural residence, and elders in the bottom three wealth quintiles are disproportionately rural. Whereas more than or nearly 80% of those in the lowest, second, and third quintiles are considered rural, two thirds of the highest quintile and almost two fifths of the fourth quintile live in urban localities.

The extent of household wealth inequality is evident. Almost two thirds of elderly in the bottom quintile live in households with none of the 17 household possessions. The second and third quintiles have successively more assets, but increases in mean numbers are modest. Even among the second quintile, households average only one possession, and fully a quarter has none. Considerably larger increases in household possessions are apparent by the fourth quintile and more so by the fifth quintile. The condition of housing also varies by wealth quintile. All of the households in the lowest quintile lack any of the four favorable housing features, as do more than two fifths in the second quintile. The third and fourth quintiles average more than one favorable housing feature. Most elders in the top wealth quintile live in houses with at least a few favorable features.

Table 3 assesses the patterns of health statuses by sex, age, educational attainment, location of residence, and wealth quintile. Results reveal statistically significant sex, age, educational, and wealth differentials in all four health indicators. Women report statistically significant worse self-rated health and a greater number of functional limitations compared with men. There are also higher proportions of sensory impairment and disability among female than male elders. Results further indicate that health progressively worsens as individuals age for all aspects of health considered in this study. There are far fewer health problems among persons aged 60 to 69 compared with those in the older age groups, particularly those aged 80 and above. The oldest old in the sample have 3 times as many functional limitations as those aged 60 to 69. Moreover, proportions of the oldest old with sensory impairment and disability are 2 and 6 times greater than for the young old, respectively. On average, persons aged 80 and older tend to rate their health as poor

Table 3. Health Status of Older Persons in Myanmar by Sex, Age, Education, Location of Residence, and Wealth Quintile.

	Self-rated health[a]	Number of functional limitations[b]	Sensory impairment[c]	Disability[d]
	M	*M*	%	%
All	2.84	1.40	35.1	9.4
Sex[e]				
Male	2.73	1.10	30.3	8.0
Female	2.93	1.66	39.2	10.6
Age[e]				
60-69	2.70	0.81	25.8	4.3
70-79	2.94	1.67	40.0	10.1
80+	3.11	2.93	57.8	26.2
Education[e]				
No education	2.96	1.82	50.8	11.3
Some primary	2.86	1.41	34.8	10.2
Complete primary	2.75	1.15	27.8	7.1
Beyond primary	2.72	1.08	23.0	7.0
Location of residence[e]				
Rural	2.82	1.35	35.8	9.1
Urban	2.87	1.52	33.8	10.1
Wealth quintile[e]				
Lowest	2.98	1.57	46.6	9.3
Second	2.85	1.44	40.2	10.9
Third	2.82	1.40	33.9	11.0
Fourth	2.76	1.34	29.0	9.3
Highest	2.77	1.27	25.3	6.5

Source. The 2012 Myanmar Aging Survey.

[a]Self-rated health has a scale of 1 (*very good*) through 5 (*very poor*). A higher score indicates worse self-rated health.

[b]Any difficulty performing five functions: Walking 200 to 300 m, lifting 5 kg, crouching/squatting, using fingers to grasp, and walking up/down stairs.

[c]Difficulty seeing or hearing (even if wearing glasses or using a hearing aid if older persons had them).

[d]A lot of difficulty, or cannot, eat, get dressed and undressed, bathe, get up after lying down, or get to and use the toilet.

[e]Differences in all health measures by age, sex, education, and wealth quintile are statistically significant at the .05 level or beyond. In addition, urban–rural differences in functional limitations are significant at the .05 level. However, urban–rural differentials in other health indicators are not statistically significant. We performed ANOVA for continuous outcome variables (self-rated health and number of functional limitations) and chi-square tests for binary outcome variables (sensory impairment and disability).

and report difficulty with three out of five physical functions. Well more than half of them have sensory impairment, and about a quarter are considered disabled.

Likewise, we find an inverse gradient association between education and all four measures of health problems. Generally, elders with low educational attainment experience worse health statuses than their better-educated counterparts. Respondents with no education report significantly worse self-assessed health, greater functional limitations, and more sensory impairments and disabilities than those with some primary schooling, who in turn have poorer health than elders who completed or had beyond primary education. Note that the health gaps are not particularly salient between elders who completed primary and those who studied beyond primary education.

Unlike age, gender, and educational differentials in old-age health, we do not find consistent urban–rural patterns in health statuses. We find that only urban–rural differentials in functional health are statistically significant at .05 level and that urban elders on average report greater functional limitations than their rural counterparts. Furthermore, regarding bivariate association between economic status and health, we find statistically significant inverse relationships between wealth and health problems except for ADL disability. Economic gradients are particularly salient for functional limitation and sensory impairment. Although wealthier elders generally report better self-assessed health than those in lower wealth quintiles, this is not the case for the top two quintiles whereby the health difference among them is minuscule. For disability, we do not observe gradient relationships between wealth and health. Only elders in the topmost quintile report a considerably lower level of ADL disability than the rest.

Multivariate Analyses

In Tables 4 and 5, we use OLS and binary logistic regression models respectively to examine how economic status is associated with health in later adulthood. More specifically, we investigate the extent to which health differences exist across household wealth quintiles, particularly whether there are health differentials between the bottom two wealth quintiles, that is, between those who are the poorest and those who are quite poor but not at the extreme end of the distribution. Furthermore, we assess whether the observed gradient bivariate associations between economic status and health (if any) hold across the four health indicators after controlling for older persons' socio-demographic characteristics. For each health indicator, we report three additive models. The first model considers health status as a function of household wealth only; the second model adds sex and age; and the last model

Table 4. Unstandardized Coefficients and Two-Tailed *p* Values (in Parentheses) From Ordinary Least Square Regression Models Predicting Self-Rated Health and Functional Limitations Among Older Persons Aged 60 and Above.

	Self-rated health			Number of functional limitations		
Independent variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Wealth quintile (lowest = ref)						
Second	**−0.126** (.003)	**−0.123** (.003)	**−0.126** (.003)	−0.127 (.137)	−0.091 (.231)	−0.122 (.112)
Third	**−0.168** (.000)	**−0.154** (.000)	**−0.158** (.000)	**−0.161** (.053)	**−0.146** (.049)	**−0.187** (.013)
Fourth	**−0.208** (.000)	**−0.219** (.000)	**−0.240** (.000)	**−0.228** (.006)	**−0.208** (.005)	**−0.293** (.000)
Highest	**−0.215** (.000)	**−0.206** (.000)	**−0.251** (.000)	**−0.299** (.000)	**−0.299** (.000)	**−0.450** (.000)
Female (male = ref)		**0.188** (.000)	**0.197** (.000)		**0.494** (.000)	**0.424** (.000)
Age (60-69 = ref)						
70-79		**0.240** (.000)	**0.239** (.000)		**0.854** (.000)	**0.814** (.000)
80+		**0.395** (.000)	**0.389** (.000)		**2.082** (.000)	**1.988** (.000)
Currently married (not married = ref)			0.017 (.581)			**−0.174** (.002)
Number of household members aged 18+			0.004 (.604)			**0.061** (.000)
Education (no education = ref)						
Some primary			0.027 (.447)			−0.015 (.819)
Compete primary			−0.035 (.452)			−0.096 (.254)
Beyond primary			−0.023 (.662)			−0.079 (.379)
Urban residence (rural = ref)			**0.104** (.001)			**0.239** (.000)
Constant	**2.979** (.000)	**2.737** (.000)	**2.687** (.000)	**1.565** (.000)	**0.697** (.000)	**0.649** (.000)
Adjusted R^2	.008	.051	.053	.003	.205	.211

Source. The 2012 Myanmar Aging Survey.
Note. Total unweighted number = 4,080. Coefficients significant at the .05 level or beyond are shown in bold type.

Table 5. Odds Ratios and Two-Tailed *p* Values (in Parentheses) From Binary Logistic Regression Models Predicting Sensory Impairment and Disability Among Older Persons Aged 60 and Above.

	Sensory impairment			Disability		
Independent variables	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12
Wealth quintile (lowest = ref)						
Lowest	1.000	1.000	1.000	1.000	1.000	1.000
Second	**0.771** (.010)	**0.775** (.014)	**0.781** (.019)	1.187 (.299)	1.292 (.134)	1.232 (.226)
Third	**0.590** (.000)	**0.574** (.000)	**0.582** (.000)	1.204 (.247)	1.234 (.206)	1.154 (.398)
Fourth	**0.468** (.000)	**0.450** (.000)	**0.451** (.000)	1.000 (1.000)	1.026 (.884)	0.900 (.563)
Highest	**0.389** (.000)	**0.365** (.000)	**0.367** (.000)	**0.679** (.034)	**0.663** (.028)	**0.489** (.002)
Female (male = ref)		**1.444** (.000)	**1.176** (.048)		**1.252** (.048)	1.240 (.112)
Age (60-69 = ref)						
60-69		1.000	1.000		1.000	1.000
70-79		**1.952** (.000)	**1.763** (.000)		**2.545** (.000)	**2.505** (.000)
80+		**4.092** (.000)	**3.459** (.000)		**8.061** (.000)	**7.515** (.000)
Currently married (not married = ref)			0.889 (.146)			0.809 (.116)
Number of household members aged 18+			1.037 (.104)			1.070 (.055)
Education (no education = ref)						
No education			1.000			1.000
Some primary			**0.639** (.000)			1.271 (.099)
Complete primary			**0.558** (.000)			1.075 (.726)
Beyond primary			**0.476** (.000)			1.216 (.360)
Urban residence (rural = ref)			**1.323** (.001)			1.274 (.070)
−2 log likelihood	5,183.620	4,922.323	4,861.773	2,531.876	2,305.490	2,288.189

Source. The 2012 Myanmar Aging Survey.
Note. Total unweighted number = 4,080. Odds ratios significant at the .05 level or beyond are shown in bold type.

incorporates other socio-demographic characteristics, including current marital status, number of adult members in the household, education, and location of residence.

For OLS regression models, positive unstandardized coefficients indicate worse self-rated health and functional limitations associated with the particular category, whereas negative coefficients suggest the opposite. For binary logistic regression models, coefficients are expressed as the odds ratios of having sensory impairment and disability versus having no impairment and disability for each category relative to the comparable odds of the reference category for each variable. Odds ratios above 1 indicate that the particular category is associated with higher chances than the reference category that the respondent reports sensory impairment or disability, whereas values below 1 indicate the contrary. To make it easier to identify patterns, unstandardized coefficients and odds ratios significant at least at the .05 level are in bold type.

A clear economic status–health gradient can be observed for self-rated health and sensory impairment. For these two health indicators, health advantages of wealth remain persistent even after socio-demographic characteristics are introduced into the analyses. Although the mean self-rated health is 2.84 with a standard deviation of 0.87, results in Model 3 (Table 4) suggest that, relative to those in the bottom quintile, self-rated health of elders in the second wealth quintile improves by 0.13 or roughly 15% of standard deviation. Likewise, the self-rated health of those in the third quintile improves by 0.16 or approximately 20% of standard deviation. Compared with their more economically deprived counterparts, older persons in the top two quintiles observe considerable improvement in self-assessed health, although the differences among them are minuscule. Self-rated health among those in the fourth and highest quintiles improves by 28% and 29% of standard deviation, respectively.

Results show a consistent inverse association between higher household economic status and sensory impairments in older ages. Compared with those in the bottom wealth quintile, elders who have slightly better, yet poor, economic conditions such as those in the second and third quintiles experience sizable lower likelihood of sensory impairment by about 22% and 42%, respectively (Model 9, Table 5). Their counterparts in the fourth quintile witness 55% lower odds of being sensory-impaired, whereas the richest elderly in Myanmar report almost 65% less likelihood of having problems seeing or hearing.

Unlike our findings for self-reported health and sensory impairment, results are less consistent regarding economic gradients in functional limitations. For functional limitations, we find statistically significant improvement in functional limitations among elders in the third wealth quintile and higher. The coefficients for functional limitations change only moderately after controlling for socio-demographic characteristics. On average, an older

person reports 1.4 functional limitations with a standard deviation of 1.72 (Table 3). Those in the third wealth quintile observe a 0.19 reduction in functional limitations or approximately 11% of standard deviation (Model 6, Table 4). Meanwhile, functional limitations of elders in the top two wealth quintiles decline by 0.29 (17% of standard deviation) and 0.45 (26% of standard deviation), respectively. We do not find statistically significant differences in functional limitations between the bottom wealth quintile and the second quintile.

There is nearly no net association between economic status and disability among older persons in Myanmar. With the exception of older persons in the highest quintile, we do not observe any statistically significantly lower odds of disability among those in the second, third, and fourth wealth quintiles compared with those at the bottom rung of household wealth distribution. These results are unchanged with or without socio-demographic controls. Only for elders in the topmost quintile in Myanmar are the odds of disability reduced by more than 50% compared with their counterparts in extreme poverty situation (Model 12, Table 5).

Although the associations between household wealth and health have largely been unaffected by the introduction of the socio-demographic control variables, results suggest that some of these characteristics are significantly related to health in older adulthood. Sex and age, for example, are important determinants of all four health measures included in this study. Consistent with descriptive findings (Table 3), other characteristics equal, elderly women report worse health than their male counterparts. Health problems, especially sensory impairment and disability, increase sharply as individuals reach the ages of 70s and particularly 80s, compared with those under age 70. Furthermore, results indicate that urban residence is positively associated with self-assessed health, functional limitations, and sensory impairments (but not disability). Marital status, number of adult members in the household, and education have mixed and inconsistent relationships with old-age health. Being married at the time of survey is significantly associated with better functional health, whereas the number of adult members is shown associated with greater functional limitations. Also, being better educated is consistently related to lower odds of sensory impairment. Apart from these associations, other relationships between socio-demographic characteristics and health statuses are not statistically significant.

Discussion

The foregoing analysis of the 2012 MAS examining the association between economic inequality and health among older persons in Myanmar with a

particular interest in those living in extreme poverty makes several important contributions to the current literature on the association of material wealth and health. First, our empirical findings narrow the knowledge gap about elderly health in Myanmar. Given the widespread lack of statistical data infrastructure in the country, very little is known about Myanmar's population health in general, let alone its rapidly growing older-aged population. Our study is the first to provide a systematic assessment of health situations as measured by self-rated health, functional health, sensory impairment, and disability among older persons from differing economic strata in Myanmar based on national-level survey data. In so doing, it contributes to the call by the national academies of science for such context-specific studies (Chinese Academy of Social Sciences et al., 2011).

Second, our study significantly extends the currently very sparse literature on economic/socio-economic status (SES) gradients in old-age health in extreme poverty settings, where many of today's older persons live. To the best of our knowledge, only analysis of Cambodia by Zimmer (2008), which also focuses on the association of health and the level of wealth among the poorest population segments in a very impoverished country, is closely parallel to the current study. Not only are elders in Myanmar very poor by international standards, but many of them have also lived through decades of deprivation including lack of material resources and adequate health care access and infrastructure. Our empirical findings bring some insights into the understanding about how severely material deprivation affects the aging process and whether the association between SES and health, which is found almost universally across adult populations in developed settings, still holds in the context of older population in a very poor country. Furthermore, in addition to their theoretical contribution, information on economic/SES gradients in health can inform policies aimed to reduce health disparities in least developed nations.

Using household possessions and dwelling quality as an indicator of economic status, our study demonstrates that poverty is widespread among older persons in Myanmar. A majority of elderly, specifically those in the bottom three quintiles of wealth distribution, clearly live in abject poverty as measured by household possessions and quality of housing. The bottom two quintiles live in particularly materially deprived households, and the middle (third) quintile does not witness much improved material conditions either. It is only among the top two quintiles that household possessions and housing amenities typical in other neighboring Southeast Asian countries become more evident.

With this knowledge of Myanmar's poverty profile, we find significant associations between wealth quintiles and most health indicators included in our study. Evidence indicates that self-assessed health, sensory impairment,

and for most part, functional limitations improve with higher levels of economic status. The improvement is consistent and statistically significant with increasing wealth quintiles. Noteworthy is that health differentials between the bottom and second quintiles are clearly evident, which suggests that relative economic inequality matters even among those who are very poor. Thus, a very small difference in wealth can be associated with a substantial difference in health in an extreme poverty setting. Our findings are consistent in this respect with those for Cambodia and yield further support to the global theory of economic gradients in health (Zimmer, 2008).

The unusual case of ADL disability is worthy of some attention. Our study shows almost no relationship between economic status and disability. Elders in the bottom quintile report lower incidence of disability than those in the second and third quintiles, whereas it is only among the wealthiest that we observed statistically significantly lower odds of ADL disability. At least to a certain degree, reporting disability appears to differ from other health problems including functional limitation (Zimmer, 2008). Environmental, social, and personal expectations may influence how one reports ability to perform ADLs. Possibly elders who are in the most dire poverty have low expectations for themselves and thus a higher threshold for acknowledging difficulties in everyday affairs. This interpretation for such a puzzling result nevertheless remains purely speculative.

This study is not without limitations. As noted, the sample design excluded Kachin State from the sample for security reasons. Moreover, because objective measures of health or biomarkers are not available in the MAS, we are restricted to rely solely on self-report measures of health. Furthermore, although we recognize that poverty is a multi-dimensional concept, due to the limitation of our data source, we primarily consider only one aspect of poverty (i.e., material deprivation) among older persons in Myanmar. Nevertheless, our measure of household wealth is comprehensive considering both household possessions and housing quality, and such approach is well established in the literature (Rutstein & Johnson, 2004; Zimmer, 2008). Importantly, because the data are cross-sectional, we can only examine associations between health and wealth, and are unable to determine causal sequences and underlying mechanisms. Although it is plausible that health affects wealth, past studies show that it is more likely that the relationships run from wealth to health (Adler & Ostrove, 1999; House et al., 1994; Zimmer, 2008). If so, a myriad of proximate factors are likely to mediate the link, including exposure to stress, sense of control, working and living conditions, health-related knowledge and behaviors (e.g., diet and tobacco use), and access to medical care. In Myanmar, availability of social support from family is also likely to play an important role in health outcomes among older persons.

Not only is poverty among older persons in Myanmar extremely pervasive but so is poor health. Comparisons with neighboring Thailand make this obvious. For example, both functional limitations and disability (i.e., serious difficulties with ADL) are clearly substantially higher among older persons in Myanmar than in Thailand (Knodel, 2014). Poverty and poor health provide obvious challenges for the government, which currently lacks programs to address the needs of the older population. Clearly, there is an urgent need to improve the health system to benefit persons of all ages. Moreover, our finding that small differences in wealth among the most impoverished older population are associated with better health according to several of our health measures suggests that even modest efforts to improve their standard of living may not only make their lives more comfortable but also have beneficial health impacts. To judge the extent this would be the case, however, it is critical to establish the pathways through which small differences in material well-being affect health. Without such knowledge, the implications for the development of policies and interventions will be difficult to determine (Adler & Ostrove, 1999). Further research to uncover these mechanisms that underlie the health differences that exist even within the very impoverished segment of the older-aged population deserves priority.

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